



Theater Missile Defense: A Joint Enterprise

By DENNIS McDOWELL

*USS Bunker Hill test
firing missile.*

U.S. Navy

Summary

When the first Patriot missile rose to meet an incoming Iraqi Scud during the Persian Gulf War, it heralded the age of anti-tactical missile defense. As ballistic missiles proliferate, theater missile defense (TMD) will continue to receive attention and resources while planners and commanders are considering its political and military implications. Proliferation has prompted adapting the Strategic Defense Initiative to protect not only the United States but also our forward-deployed forces. A residual presence abroad is inevitable for the foreseeable future to reassure our allies and maintain a sufficient infrastructure to rapidly expand our force structure if conditions demand. The deterrent value of such capabilities will be threatened without a defense against area ballistic missile threats. That protection will require a variety of TMD options as well as careful coordination among all the services, the NATO Alliance, and ad hoc coalition partners.

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When Patriot air defense batteries modified for an anti-tactical ballistic missile (ATBM) role were deployed to Israel and Saudi Arabia during the Persian Gulf War, history was made as the Armed Forces intercepted an attacking Iraqi Scud in defense of forward-deployed forces and allied territory.¹ Patriot's success inaugurated a joint theater missile defense (TMD) mission when Army batteries rapidly deployed on Air Force C-141 Starlifters and the sensor cuing of American missiles against Scuds was carried out by Air Force space-based assets. While the debut of Patriot was not perfect, its political value in underwriting Israeli restraint to ensure the solidarity of the coalition was pivotal to the overall success of Operation

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Desert Storm. From now on TMD will be a critical component of joint and combined warfare as ballistic missile proliferation becomes an increasingly serious global problem.

As the United States projects military power overseas for crisis response and to protect vital interests, TMD may become a central feature of the politico-military equation.

Because of missile proliferation in the post-Cold War world, the Strategic Defense Initiative (SDI) program was redirected in early 1991. The new focus was the development of defenses to protect not only the United States, but also our forces deployed overseas, power-projection forces, and allies and friends against accidental, unauthorized, or deliberate limited ballistic missile strikes, whatever their source.² The Gulf War made pursuit of effective TMD a top priority, as manifest in the Missile Defense Act of 1991 and renewed in subsequent National Defense Authorization Acts.³ This increased focus on TMD was sharpened by the Bottom-Up Review which established TMD as having the highest priority.⁴ Current ballistic

missile defense plans provide for more effective TMD systems to become operational during the course of this decade.

The following discussion of TMD addresses its role in national military strategy, the status of current programs, and the effective integration of this new mission into joint doctrine, planning, doctrine, operations, and organization as well as into combined warfare.

U.S. Strategy

American strategy has shifted significantly with the end of the Cold War and demise of the Soviet Union. It is no longer based primarily on a global threat to U.S. interests, but instead on unpredictable and ambiguous regional threats. This shift occurred as a significant proliferation of ballistic missiles with ranges that could seriously threaten regional stability spread to a number of potentially hostile states. As a result, the significance of TMD requirements in the

Patriot missile launcher in Saudi Arabia.



DOD (Pete Williams)

overall scheme of national military strategy has become more urgent than ever.

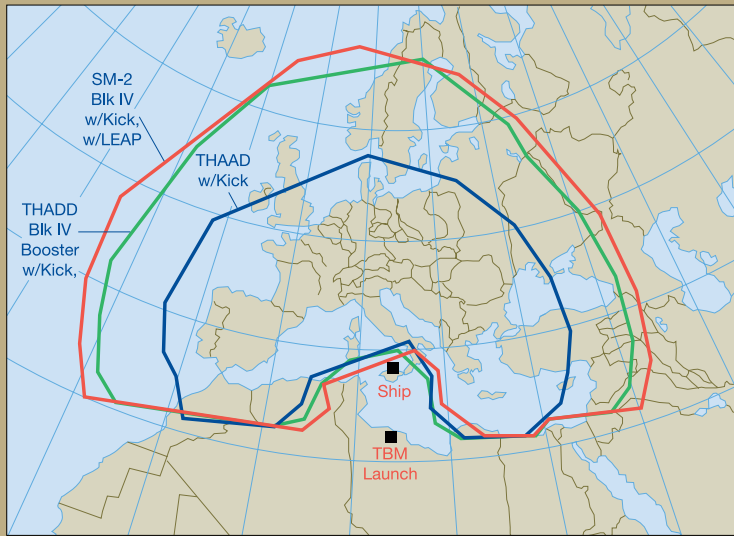
The relevance of the TMD mission can be readily understood in the context of the Bottom-Up Review which identified four categories of "dangers" to U.S. security interests:

▼ dangers posed by nuclear weapons and other weapons of mass destruction, including the proliferation of such weapons and the massive Russian nuclear arsenal inherited from the former Soviet Union

▼ regional dangers, including aggression by regional powers—some with ballistic missiles—against the security interests of the United States,

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Defended Footprints of Missile Propulsion Options



A layered defense protects targets by intercepting ballistic missiles in the boost, ascent, midcourse, or terminal stage. This chart illustrates defended footprints for three areas from the North Atlantic to the Eastern Mediterranean defended by (a) Theater High Altitude Area Defense (THADD) system with Kick propulsion option, (b) THADD Block IV booster with Kick, and (c) Standard missile-2 Block IV with Kick and Lightweight Exoatmospheric Projectile (LEAP).

Source: U.S. Navy

as well as internal conflict within states of key regions that threatens stability

▼ dangers to democracy and reform in the new independent states of Eurasia

▼ economic dangers—both internal and external—to the United States.⁵

Since U.S. forces are key to deterring or defending against regional threats, the capability to deter or defeat aggressors in major regional conflicts (MRCs)

was the primary planning factor in the methodology used in the Bottom-Up Review. Moreover, a fundamental assumption in sizing our force structure was that we must be able to fight and

win two nearly simultaneous MRCs.⁶ Both the overseas presence of U.S. forces and U.S.-based contingency power projection forces will play major roles in successfully combatting regional aggression; and when aggressors possess ballistic missiles, TMD forces will also be essential.

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In the event of a hostile invasion that threatens U.S. security interests, the highest priority of the Clinton administration's strategy will be to halt such an invasion as early as possible in an initial defense. After that is accomplished U.S. forces will be built up in-theater concurrent with efforts to degrade enemy forces; then a counteroffensive to decisively defeat the enemy will follow; and finally residual forces will remain to guarantee post-war stability.⁷ One of the major tasks that must be performed in the critical first-phase initial defense is protection of friendly forces and rear area assets from attack by aircraft and both cruise and ballistic missiles since their loss could be catastrophic for effective combat operations.

Appreciation of the quantitative threat from ballistic missiles can be derived from the threat projections for possible regional aggressors that were posited for the Bottom-Up Review. In the future U.S. forces could be faced with hostile forces in a specific region comprised of as many as 750,000 troops, 4,000 tanks, 5,000 armored vehicles, 3,000 artillery pieces, 1,000 aircraft, a 200-ship navy, and anywhere between 100 and 1,000 Scud-class ballistic missiles (some armed with weapons of mass destruction).⁸

Short of actual hostilities, TMD will be important in maintaining regional deterrence and stability. While American presence overseas is being reduced (especially in Europe), and there is an ongoing substantial downsizing of force structure, it is essential that some presence be retained. It is an important political assurance for our allies and a requisite for preserving our global security interests and regional interests such as a stable supply of oil from the Middle East. Moreover, the infrastructure of bases and daily contact with allies would be critical in restoring a major presence if required by a reemergent or newly emerging threat. Ultimately the deterrent posture of overseas U.S. forces could be undermined if they became vulnerable to regional ballistic missile threats.

Given the diverse U.S. interests at risk in various regional security environments, a variety of flexible deployment modes will be desirable. For example, our presence in NATO should make fixed ground-based TMD a viable option for European defense. TMD in Europe could entail a mix of U.S. and allied assets; in addition, sea-based TMD in-theater

would be an excellent complement to—if not a partial alternative for—ground-based TMD. In areas such as the Middle East where U.S. security presence must be less conspicuous for obvious political reasons, TMD may have to be positioned either just over or on the horizon. Sea-based TMD along with rapidly-deployable Army TMD units are well-suited for this situation. In Northeast Asia, flexible TMD planning may be needed to balance the interests of allies and friends alike. Finally, ballistic missile threats could conceivably arise elsewhere with little warning—an event that could require contingency projection of TMD capabilities in crisis response similar to the initial use of Patriot in the Gulf War.

In sum, a regionally oriented strategy requires that all U.S. forces operating in-theater be protected against missile threats. This previously missing dimension of U.S. strategy is now fully appreciated. For example, the new Navy TMD program is essential to the “littoral” strategy which now defines the Navy’s approach to ensuring regional stability. Yet, complexity and uncertainty are constants. The complexity of U.S. politico-military relations with other countries as well as the unpredictability of future crises which could involve ballistic missile threats dictate that the TMD mission must be dynamic, flexible, adaptive, and *joint*. These mission characteristics are reflected in TMD programs and should guide us in integrating TMD into doctrine, planning, operations, and organization for joint and combined warfare.

Multiservice and Multinational

The overall program objectives of the Clinton administration are to field a TMD capability rapidly by upgrading existing systems and developing more advanced systems for acquisition later in this decade. The proposed budget to support those goals is \$12 billion for FY95–FY99.⁹

An array of service programs reinforces the joint and combined nature of the TMD mission. The TMD Initiative (TMDI) involves the Army, Navy, and Air Force.¹⁰ The



*Guided missile cruiser
USS Mobile Bay.*

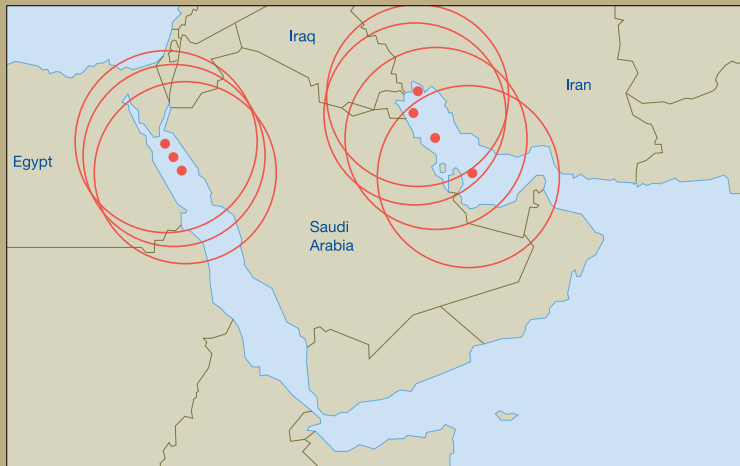
U.S. Navy

elements of the Army candidate system have included upgrades to Patriot (PAC-2 and PAC-3) to be fielded over the next six years. PAC-2/3 upgrades expand the system’s battlespace for lower tier ATBM area coverage, increase firepower, and enhance lethality with possible hit-to-kill technology.

The Army is developing a wide-area, upper tier system called Theater High Altitude Area Defense (THAAD) made up of advanced high-altitude, long-range, ground-based interceptors and new ground-based radars. Fielding a deployable prototype for national emergencies could start in the mid-90s followed by an operational THAAD by 2000. It will be air-transportable for response and might be interoperable with Israel’s Arrow ATBM. In the next decade, a short-range Army Corps Surface-to-Air Missile (Corps SAM) interceptor could offer added lower tier TMD protection for rapid force projection. If deployed, Corps SAM could become compatible and interoperable with other Army, service, and allied systems for joint and coalition operations.

Navy TMD would use a planned 50-ship Aegis fleet for sea-based ATBM and theater-wide missile defense in two phases. First, a near-term capability could be provided by modifying and improving the Aegis SPY-1 radar and weapons control system for the Standard missile for defensive coverage similar to PAC-3 for fleet concentrations, debarkation ports, coastal airfields, amphibious objective areas, and expeditionary forces being inserted ashore. Second, for longer-term theater-wide

Maximum Radar Coverage of Theater



The circles traced over the Red Sea and Persian Gulf represent the approximately 400-kilometer coverage of Aegis Radars on missile cruisers. This range coverage would detect offensive missile launches from either Iraq or Iran and provide defensive protection for Saudi Arabia, Egypt, and portions of Israel as well as for ships in waters adjacent to the Southwest Asian region.

Source: U.S. Navy



Examining Scud missile northwest of Riyadh.

upper tier ATBM capability the Aegis Vertical Launch System might be upgraded to accept a sea-based interceptor consisting of Standard—with new Lightweight Exoatmospheric Projectile (LEAP) hit-to-kill technology—or a compatible Army THAAD interceptor.

The Air Force, in conjunction with the Ballistic Missile Defense Organization (BMDO),

has been studying concepts for an air-based boost phase interceptor to negate reactive countermeasures such as chemical submunitions and, through early and multiple intercept opportunities, enhance overall TMD effectiveness. Specifically, these

include an Assent Phase Intercept (API) system comprised of a modified Short-Range Attack Missile (SRAM) with a LEAP hit-to-kill vehicle and a true Boost-Phase Interceptor (BPI) using an airborne laser platform.¹¹ Air Force sensor programs for TMD currently include: upgrading or modifying the Defense Support Program (DSP) system as used in the Gulf War to cue Patriot batteries; and the Brilliant Eyes space-based sensor which has been under design by BMDO. Congress has directed the Pentagon to choose only one of these three systems to perform the missions of tactical warning and attack assessment and TMD cuing.

The outcome of the Bottom-Up Review for TMD is to continue a core program for the next five years emphasizing development and acquisition of Patriot PAC-3, THAAD, and Aegis/SM-2 Block IVA systems. Also, a technology demonstration program for Corps SAM and technology research for a sea-based upper tier system as well as for an ascent phase interceptor will proceed.¹² TMD as a broad mission entails three other tasks in addition to active defense: passive defensive measures such as hardening and deception, counterforce (preemptive) offensive attack options, and command, control, and communications for TMD assets. These tasks are no less joint in nature. For example, counterforce attack options—preemptive destruction of hostile ballistic missiles prior to launch—undoubtedly (1) will involve multi-sensor identification and acquisition of launchers, (2) will likely involve air-control targeting of both Army and Air Force ground attack aircraft, and (3) will conceivably involve Navy cruise missile attack operations. An additional asset available in the anti-missile defense repertoire is the capability of Special Operations Forces.

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Finally, command, control, and communications for TMD will possibly involve all three military departments, with Navy ship-board sensor systems interfaced with Army missile defense batteries and possibly Air Force space-based and air-based ATBM assets. Clearly the complexities and challenges of the mission will make TMD both a highly integrated joint enterprise and a critical requirement for quick victory in joint and combined warfare in the 21st century.

Beyond the oversight of TMD weapons development by the services BMDO is establishing multiservice theater test beds that can provide computer simulation analysis and modeling of TMD in the areas of system architecture, doctrine, battle planning, systems integration, and war gaming. The test beds will use existing facilities funded by BMDO and the services including the National Test Facility at Falcon Air Force Base, Colorado, and distributed National Test Bed. TMDI plans for system testing and exercising—live and simulated—are being prepared in anticipation of TMD elements to be introduced in the services by late 1996. BMDO also manages TMD international participation and cooperation that include co-funded programs such as the U.S.-Israeli Arrow and architecture studies with the British and Japanese.

The NATO approach to the ballistic missile threat is to consider it as extended air defense which has resulted in establishing an Extended Air Defense Test Bed (EADTB) that includes TMD. Both the Supreme Headquarters Allied Powers Europe (SHAPE) Technical Center and the British Defence Research Agency participate in EADTB. It has also attracted the interest of the Germans and French. One clear indication of the burgeoning interest in TMD by the Alliance is the growing array of TMD activities within NATO. There are several groups—ranging from senior committees and international military staffs to national staffs and research centers—working on various aspects of TMD integration. Some of the activities underway within NATO include:

- ▼ a Defense Research Group/Research Study Group 16 study of command and control for extended air defense

- ▼ a NATO Industrial Advisory Group (NIAG)/Sub Group 37 post-2000 technology forecast study of solutions to various ballistic missile threats

Northeast Asia Sea-Based Defense



The two circled areas shown over the Korean Peninsula indicate the defense offered by SPY Radar coverage aboard Aegis missile cruisers. The two-tier defended area indicates the upper tier of the Aegis Vertical Launch System with propulsion options.

Source: U.S. Navy

- ▼ a NATO Air Defense Committee (NADC) study of countermeasure, transportability, and interoperability issues

- ▼ an Advisory Group for Aerospace Research and Development (AGARD) study entitled "NATO Ballistic Missile Defense in the Post-Cold War Era"

- ▼ a SHAPE working group to identify long-term requirements, assess the threat, and develop operational concepts for TMD integration.¹³

In sum, TMD programs include multi-service participation in multiple weapons technologies which when integrated effectively with possible allied systems will produce robust capabilities for defending military and nonmilitary area and point targets against various theater missile threats.¹⁴

Organizing for TMD

The introduction of TMD capabilities into the Armed Forces will be an evolutionary process in the next decade. Developing joint doctrine for TMD is ongoing and will be updated periodically to accommodate programmatic changes and developments. Moreover, most allied TMD programs are at an incipient stage, and TMD planning for combined warfare raises myriad integration



U.S. Navy (Wayne Edwards)

*Missile launching from
USS Arleigh Burke.*

issues. These realities will undoubtedly challenge those planners responsible for unified direction of TMD. But if missile proliferation continues to worsen, TMD will become a joint wartime mission critical to future regional battlefields. Accordingly, a centralized and joint approach to organizing for TMD is being developed. Unity of command is a military principle of the highest order. Accordingly, TMD planning, development, and organization suggest centralized control for an array of reasons:

- ▼ missile proliferation is a global problem that requires a planning perspective spanning more than a single region or individual CINC's area of responsibility
- ▼ the evolutionary and dynamic nature of threats and regional security environments require flexible and adaptive force planning which is accomplished best with centralized control
- ▼ the readiness, versatility, and basing requirements of U.S.-based contingency forces also benefit from centralization
- ▼ the need for joint TMD training and exercises requires centralized planning direction

- ▼ the need for interoperability among U.S. and allied TMD systems for use in combined operations requires centralized technical direction, policy planning, and negotiation with allies

- ▼ centralization will ensure effective development of strategy, doctrine, and tactics for joint TMD employment

- ▼ common technical challenges for BMD systems—strategic or tactical—such as guidance, propulsion, and sensors are most effectively and efficiently solved through common efforts

- ▼ fiscal constraints in the future will dictate efficient use of resources which is best done through direction and centralized management by a single command.

DOD organization for TMD must also be considered.¹⁵ Currently the Secretary and Under Secretary of Defense for Acquisition and Technology determine overall policy, program, and fiscal guidance for TMD. Responsibility for central management and direction of TMDI is assigned to the Director and the Assistant General Manager for Theater Defense of BMDO. The Office of the Secretary of Defense develops and ensures policy implementation, conducts program reviews, and assures compliance with the acquisition

process. The Joint Chiefs of Staff and CINCs formulate concepts, validate requirements, conduct liaison with allies, issue command and control doctrine, and establish command relationships, force structure, assets, protocols, and rules of engagement.

Ultimately, of course, only decentralized mission execution under the authority of CINCs, allied commanders, or joint task force commanders can ensure that TMD is protected in a conflict. CINCs must establish appropriate subordinate components responsible for identifying, analyzing, and tracking ballistic missile threats; TMD mission operational planning, tactics, and execution; and planning and coordinating TMD support for other CINCs or joint task forces as directed.

In combined allied commands such as NATO which views TMD as extended air defense, it is most likely that TMD would become a responsibility of the air component commander. TMD must also be internalized in future joint task force planning, organization, and leadership.

And finally, the Unified Command Plan (UCP) must be updated to clarify TMD command relationships and ensure that TMD commanders are provided with logistical support, satellite early warning information, communications, and other requirements. Interservice cooperation for joint TMD operations will be critical in the years ahead especially if—due to a continuing draw down in force structure—responses to threats become more expeditionary.

In future expeditionary warfare, American lives and the success of military operations will depend upon getting TMD protection to regions of interest prior to the arrival of U.S. forces and the

effective integration of those defenses into an operational plan (OPLAN). Moreover, when combined operations are involved—including allied TMD systems—still another complex dimension will be added to planning, coordination, and operations with formal allies and coalition partners.

The ability to follow up on the groundbreaking success of Patriot in the Persian

Gulf War and actively shape theater ballistic missile defense as an exemplary joint and combined enterprise will prove critical to the success of U.S. strategy in the post-Cold War world.

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NOTES

¹ The first Patriot interception of an Iraqi Scud occurred on January 18, 1991.

² On January 29, 1991, President Bush ordered refocusing SDI on Global Protection Against Limited Strikes (GPALS).

³ See the National Defense Authorization Acts for fiscal years 1992, 1993, and 1994.

⁴ The review affirmed Secretary Aspin's initial guidance issued in May 1993 when the Strategic Defense Initiative Organization (SDIO) was redesignated the Ballistic Missile Defense Organization (BMDO).

⁵ Office of Assistant Secretary of Defense for Public Affairs (OSD/PA), "Secretary Aspin Announces Bottom-Up Review Results," News Release, September 1, 1993, p. 1.

⁶ Ibid, p. 10.

⁷ Ibid, p. 7.

⁸ Ibid, p. 5.

⁹ Office of the Assistant Secretary of Defense for International Security Policy (Strategic Defense Policy), "U.S. BMD Policy Point Paper," September 21, 1993.

¹⁰ Ballistic Missile Defense Organization, "1993 Report to Congress on the Theater Missile Defense Initiative (TMDI)" (Washington: Department of Defense, June 1993).

¹¹ The original BMDO proposal for BPI (Brilliant Pebbles) was relegated to a research program.

¹² See OSD/PA, News Release, op. cit.

¹³ Source material for NATO activities: R. Peat and R. Goodwin, "Theater Missile Defense Integration Issues," DNA-TR-92-102-N (Washington: Defense Nuclear Agency, June 1993.)

¹⁴ A comprehensive review of projected threats is found in *Ballistic Missile Proliferation—An Emerging Threat, 1992* (Washington: System Planning Corporation, 1992).

¹⁵ For more details on TMD responsibilities, see Ballistic Missile Defense Organization, "1993 Report to Congress," op. cit., pp. 4-2 through 4-5.

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